ART. 13. NOTES ON A HERPETOLOGICAL COLLECTING TRIP THROUGH THE SOUTHEASTERN LOWLANDS OF BOLIVIA

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INTRODUCTION

This paper is a report on a brief collecting trip across the department of Santa Cruz which includes the southeastern lowland region of Bolivia (chaco boliviano). This region has been made much more accessible by the construction of the Brazil-Bolivia Railway, and it was the courteous help of its officials and personnel that made the trip both possible and successful.

I was accompanied on the trip by Padre Francisco Silverio Pereira, C.M.F., of the Departamento de Zoologia (São Paulo, Brazil). Because of our personal interests, collections consisted mainly of insects, amphibians and reptiles, though small groups of other forms were also collected (*cf.* Lane, 1956; Bechyneé, 1956, 1958; and Parodiz, 1958). This paper presents the general itinerary, a brief description of the region traversed and an annotated list of the approximately 900 specimens of reptiles and amphibians resulting from the fourteen-day trip (February 21 to March 5, 1954). The 800 frogs represent 30 forms, thus tripling the fauna reported by the first German Gran Chaco Expedition, which visited this region from August to October 1926 during the dry season which is much less propitious for amphibian collecting. In view of the scanty information regarding the life histories of most of these species, field observations are also included.

One of the aims of publication is to call the attention of specialists to the existence of this collection. The status of the herpetofauna of central South America is still such that even preliminary identification of a collection often requires some revisionary work on the specific and generic level, as well as an acquaintance with the species in regions far removed geographically. In the absence of recent revisions, identifications of reptiles were carried to the specific level only. Various specimens were made available to specialists who had revisions in progress.

Specimens were deposited in the following institutions. They are identified by code letters throughout:

A.M.N.H.	American Museum of Natural History, New York.
C.M.	Carnegie Museum, Pittsburgh, Pa.
D.Z.	Departamento de Zoologia, Secr. de Agricultura, São Paulo, S. P., Brazil. (A representative series of frogs assigned M.C.Z. numbers will also be transferred to this institution).
M.C.Z.	Museum of Comparative Zoology, Cambridge, Mass.

ACKNOWLEDGMENTS

It is a pleasure to acknowledge the aid and assistance of the many friends who made the trip possible. At the risk of omitting others, I should like to express particular thanks to Dr. Lauro Travassos of the Instituto Oswaldo Cruz and Dr. Carlos de Paula Couto of the Museu Nacional both of Rio de Janeiro; Dra. Maria Apparecida Vulcano de Andretta, Mr. Werner C. A. Bokermann, and Dr. Paulo E. Vanzolini, of the Departmento de Zoologia,

Submitted for publication, April 12, 1958.
Issued June 3, 1960.

São Paulo; Dr. Alphonse R. Hoge and Dr. Helio E. Belluomini of the Instituto Butantan; Capt. Luis Nicolaú Velasco of the Instituto Geographico Militar, La Paz; and Mr. Benjamin R. Moser of the United States Department of State.

I am very grateful to the Comissão Mixta Ferroviaria Brasileiro-Boliviana, in particular to Dr. Luis Alberto Whately, Eng. Chefe and Dr. Francisco Gonçalves de Aguiar, Eng. Chefe Substituto, who arranged for room, board and transportation during our travels. The hospitality and assistance of Dr. Carlos Moreno T., Mr. Alberto Silles Rogas, Dr. Armillo Monteiro, Dr. Alfonso Valderama, Dr. Rolando Chasal, all of the Comissão Mixta, are also acknowledged with pleasure.

Specimens were contributed by several individuals, in particular by Madre Esther Bottega of the Colegio "Santa Clara" of San José de Chiquitos, and by Sr. Orivaldo Oliveira Nogueira of El Portón.

The lizards were identified by Dr. P. E. Vanzolini. Since circumstances prevented Mr. W. C. A. Bokermann from completing the identification of the frogs, the collection was reviewed by Mr. Benjamin Shreve of the Museum of Comparative Zoology. The latter also reviewed certain doubtful identifications of snakes made by me. I certainly appreciate having had the benefit of his wide knowledge of South American reptiles and amphibians.

Joseph R. Bailey, Robert L. Dressler, Coleman J. Goin, M. Graham Netting, Neil D. Richmond, William J. Riemer and Ernest E. Williams read and commented on the manuscript. Messrs. Lee Bolton and Robert D. Weigel printed the photographs and Howard W. Campbell confirmed some of the scale counts.

The trip discussed here was made while I was the recipient of a John Simon Guggenheim Memorial Fellowship, and I should like to thank the Foundation and especially Messrs. Henry Allan Moe and James F. Mathias for their continuing and appreciated interest. The report was completed with the aid of a postdoctoral Research Fellowship from the University of Florida.

I should finally like to thank my colleague Padre Francisco Silverio Pereira, C.M.F., for his pleasant companionship during our journey.

GENERAL

Since the time was unfortunately limited it was known from the beginning that the trip could at best amount to a preliminary survey of this poorly known region. In order to achieve the maximum results in terms of collections it was planned to restrict the stops to not more than three days each. Side trips involving auxiliary transport were also avoided in order to permit most efficient use of the brief period available. It was reasoned that any station within a recently opened area would have approximately equal probability of yielding interesting material and that the greatest need was for adequate series of specimens. However, this restriction to the transect formed by the railroad right of way did make for a limited view of the country and the comments should be evaluated with this in mind.

Frog collecting was most productive from the start and most of the work was therefore done at night to take maximum advantage of this.

The collecting stations (Fig. 1) follow the right of way of the railway between Corumbá, Mato Grosso, Brazil and Santa Cruz de la Sierra, Bolivia,

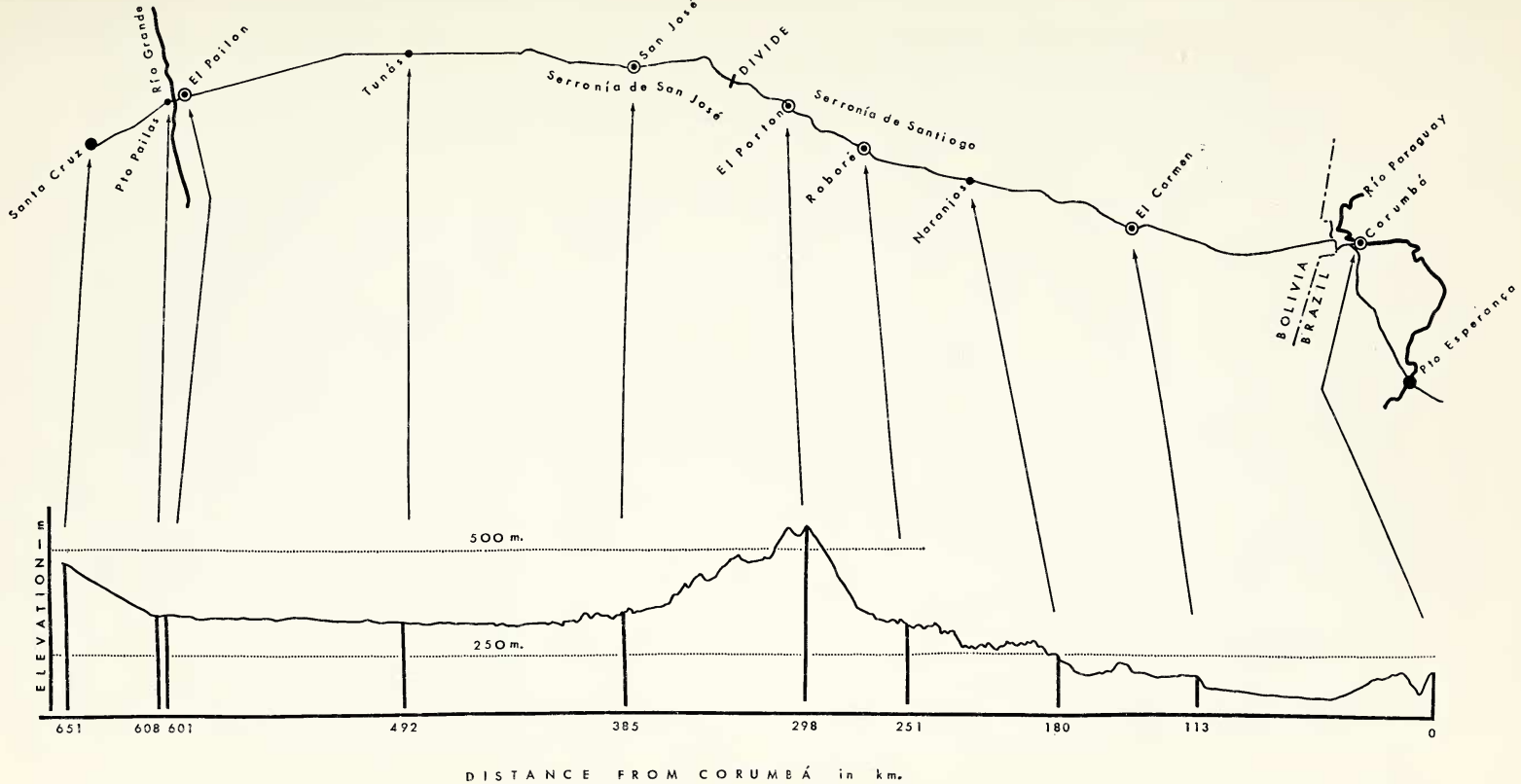

Fig. 1. Map of collecting stations and profile of the railroad right of way from Corumbá, Brazil to Santa Cruz de la Sierra, Bolivia. Modified from map furnished by C.M.F.B.B.

capital of the department of the same name. With the exception of Corumbá all stations were within the Bolivian department of Santa Cruz, which is the largest in that country, though far from being the one best known, herpetologically or otherwise. Through it passes the divide between the Río de la Plata and Amazonas drainages, but with few exceptions the divide is very low, and the drainage of large districts may be either way depending upon the relative rainfall. Haseman (1912) who made extensive fish collections in the vicinity, comments upon the fact that the barriers, if any, to the distribution of fluviatile species between South American watersheds are generally not formed by the divides.

The main branches of the two river systems flow in parallel but opposite directions and effectively delimit the region in question. East of the Paraguay stretch the lowland Pantanals, which apparently extend up from the South. Corumbá lies on a bluff on the west (at this point actually south) shore of the river, which here describes an arc, though its general course is southward. Near the other side of the department lies the northward flowing Río Grande (Guapay), with the city of Santa Cruz situated some 40 km. west of this. The extreme flatness of the region between the two river systems is broken only by the several Serranías and may be noted from the profile of the right of way shown in Fig. 1. For the 230 km. between San José and Pto. Pailas the variation of height amounts to less than 25 m., most of which occurs at the eastern end of the stretch. East of the crossing of the Serranía de Santiago, at El Portón, the profile undergoes greater changes because the railway line has been located away from the annually flooded lowlands.

Rainfall and temperature data (Fig. 2 and 3) are available for only the two terminal points of the traverse.

Readers desiring more detailed climatological data for Brazil are referred to Margarinos Torres and Mortera (1948) and Anonymous (1941), as well as to the various publications of the Instituto de Geographia e Estatística in Rio de Janeiro. Bolivian data are poorer and much harder to obtain. Some information is given by Peña and Escobar (1947), while Osborne's (1954) little booklet "Bolivia" gives a good bibliography of other material. Geological information on Bolivia may be found in Ahlfeld (1946).

The data for Santa Cruz in Fig. 2 and 3 are theoretically applicable only to the station at El Portón, since Santa Cruz lies on the outlying foothills of the Andean chain and at a higher elevation than all but this station. The apparent effect of this on the vegetation is mentioned by Herzog (1913, p. 2) who comments on the presence of Brazilian, Andean and Argentinian elements in the Santa Cruz flora.

The monthly data however, do give a very excellent indication of the extremely seasonal rainfall pattern. Thus the rainy season lasts from October through March, and the country is partially inundated during this time. Prior to the advent of railroad and plane service, transportation used to be close to a standstill during this season. Upon the cessation of the rains there is said to be a rapid drop in the water-table and the winter is dry.

The vegetation appears to reflect the rainfall cycle, and the peculiar interdigitation of *pantanal* and *cerrado*. As shown by the views in Fig. 4-7, most regions are covered by a scrub forest ranging in many places to a height of approximately 10 m., with a high frequency of thorny and xerophytic species.

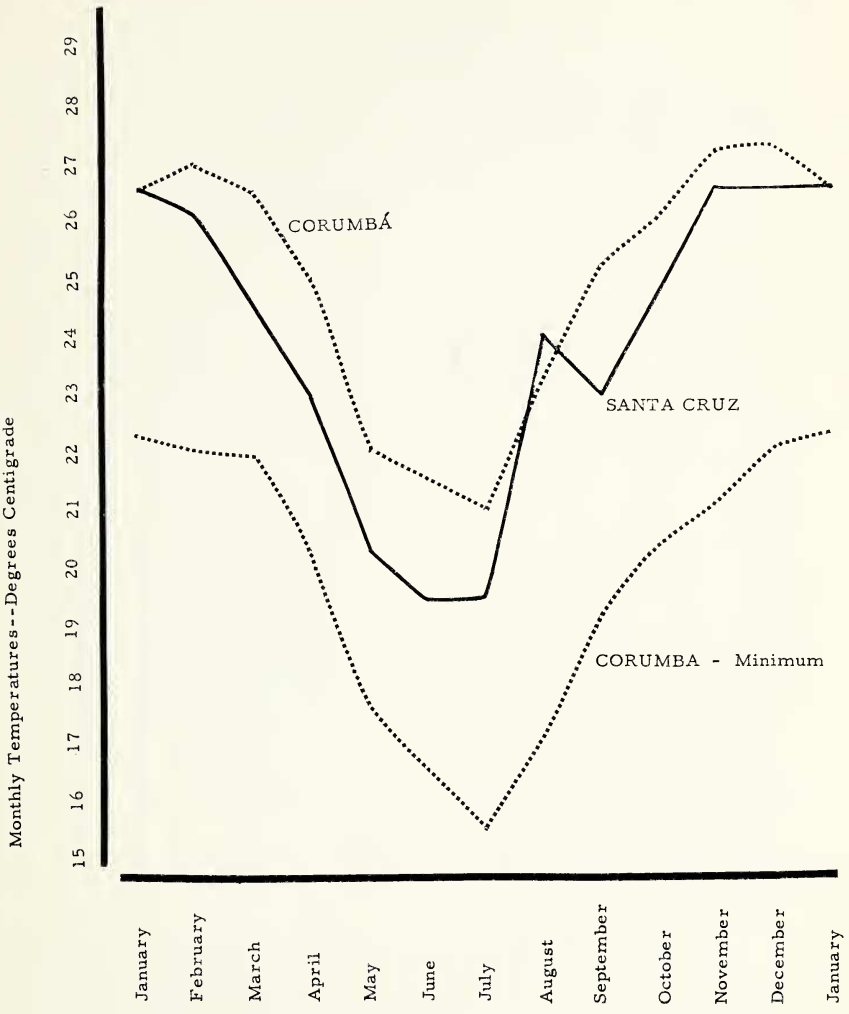

Fig. 2. Monthly temperature data for Corumbá and Santa Cruz de la Sierra. The overall and minimum mean monthly temperatures for Corumbá are from the Normais Climatologicas (Anonymous, 1941) and represent averages for the years 1922-35. The Santa Cruz data are from Peña and Escobar (1947) and apply to 1945 only

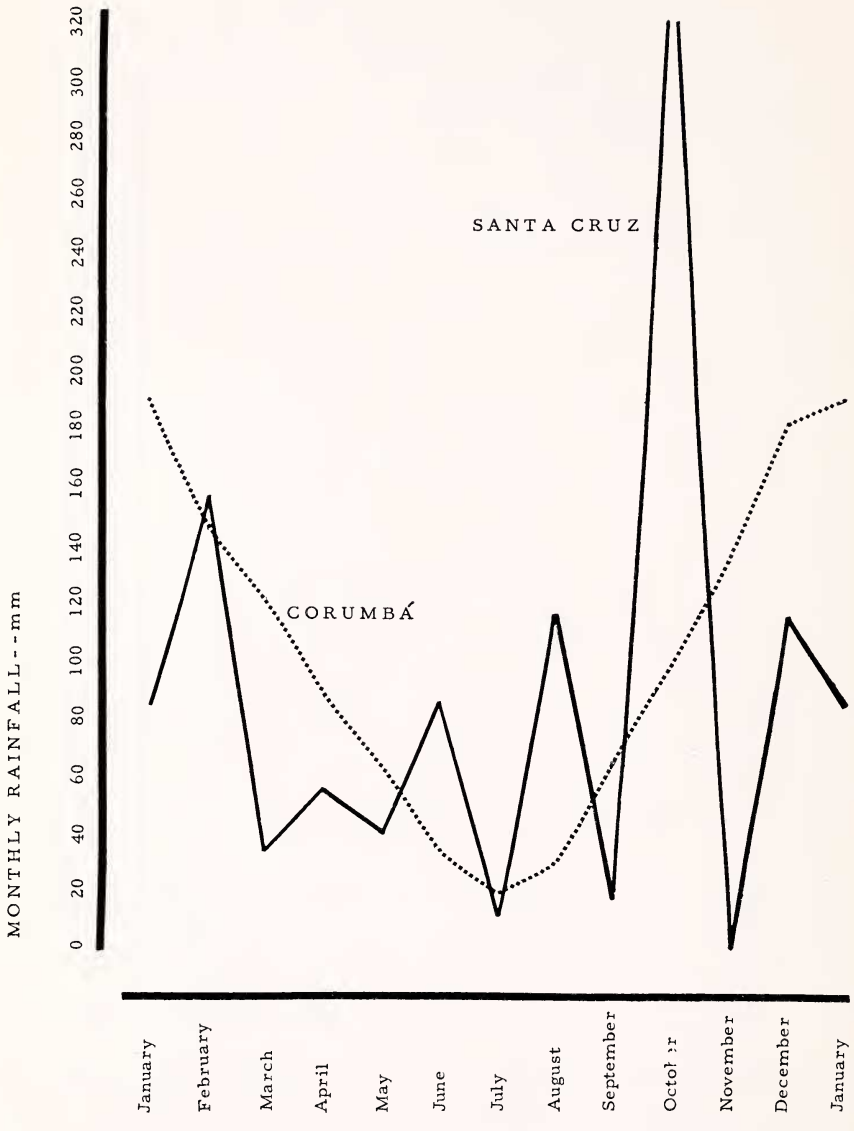

Fig. 3. Monthly rainfall data for Corumbá and Santa Cruz de la Sierra from the same sources as Fig. 2. The Corumbá points represent an average for the years 1912-13 to 1935. Those for Santa Cruz give the rainfall for 1945 only

Particularly noticeable were a tall cactus, five meters or more in height (Fig. 6) and a spiny bottle trunk tree (*Chorisia*?) of the family Bombacaceae (Fig. 7), scattered through the forest. There appear to have been no studies made of this flora except for purely taxonomic ones, and Mann's popular volume (1951) offers only some general comments.

The first recent account of the area resulted from an Argentine expedition (Lizer, 1919) investigating the distribution of *Schistocerca paranensis*. A more extensively illustrated general report is given in the travelogue of the 1925-26 Instituto Oswalda Cruz medical expedition (Fonseca, 1929). The herpetological results never appeared in print even though it is stated that the snakes were turned over to Dr. Oswaldo Mello. Another very much popularized and somewhat lurid description will be found in Duguid's book "Green Hell" (1931).

It may be of interest to compare the present collection with that compiled in the dry season by the first German Gran Chaco Expedition, which spent more than two months in the Province. Such comparison (shown in table on page 290) has been carried out for the amphibians by using Müller and Hellmich's report (1936). Of the species reported by them from this region, all but one (*Hyla phrynoderma* from Santa Cruz de la Sierra) were obtained during the present trip. Nine additional forms recorded by them from northern Paraguay and Argentina, and 10 forms not mentioned at all are added to the known fauna of the province by this report.

Reference should also be made to the extensive collections made in Santa Cruz de la Sierra over many years by the elder J[osé] Steinbach. His specimens are now scattered in many museums, with many in the Carnegie Museum and in the Museum of Zoology of the University of Michigan. The present collection complements rather than overlaps his material as he does not appear to have visited the eastern lowland regions, and restricted his activities to the slopes of the Andes between the cities of Cochabamba and Santa Cruz de la Sierra.

Recently there appeared the report of the second Oswaldo Cruz Expedition (Travasso, *et al.*, 1957). This expedition obtained 26 reptiles and 68 amphibians, representing a total of 21 species collected and sacrificed for a study of their parasites. All of the Bolivian species recorded by them are also listed in the present report.

The construction of the railway line has already affected the nature of the country in two ways. First is the excavation of drainage ditches and borrow-pits, from which soil had apparently been removed for fill. (Because of the lack of suitable rock outcrops it has been necessary to transport the track ballast from the vicinity of Corumbá.) Many of the borrow-pits were filled with water and provided excellent frog breeding pools. The second and far less superficial change was produced by the increasingly intensive cattle grazing and the cutting of the forest to provide "leña" (fire-wood) for the wood-burning locomotives. Experience in Brazil has shown the remarkable extent to which the grazing of cattle will keep down the shrubs and smaller plants of the *cerrado*. When the larger trees are selectively logged at the same time there is little opportunity for replacement. Seedlings will be cropped before they can grow to size and the character of the landscape changes.

	PRESENT COLLECTION												OTHER COLLECTIONS		
				El Carmen			Roboré						Müller & Hellmich (1936)		Travassos & Travassos (1957)
	Corumbá	Station at	E. of	Reservoir at	Station at	3 km. S. of	El Portón	San José	Tunas	El Pailon	Pto. Pailas		Bolivia	Argentina	
Dendrobates flavopictus	-	-	-	-	-	-	X	-	-	-	-		-	-	-
Bufo granulosus major	-	-	-	-	-	-	-	X	-	-	-		X	-	X
paracnemis	X	-	-	-	X	-	X	X	-	X	X		X	-	X
typhonius	-	-	-	-	-	-	X	-	-	X	-		X	-	-
Hyla geographica punctatissima	-	-	-	-	-	X	-	-	-	-	-		-	-	-
leucophyllata	-	-	-	-	-	-	-	-	-	X	-		-	-	-
megapodia	X	-	-	-	-	-	X	-	-	X	-		-	-	-
minuta	-	-	-	-	-	-	X	-	-	-	-		-	-	-
rubra nasica	X	X	X	-	-	-	-	X	-	X	-		-	X	X
raniceps	-	-	-	-	-	-	-	X	-	-	-		X	-	-
senicula	X	-	-	-	-	-	X	-	-	X	-		-	-	-
Phrynohyas zonata	-	-	X	-	-	-	-	-	-	X	-		X	-	X
Sphoenohyla nana	X	-	X	-	X	X	X	X	-	X	-		-	X	-
Phyllomedusa hypochondrialis	-	-	X	-	-	-	-	-	-	-	-		-	X	-
pailona	-	-	-	-	-	-	-	-	-	X	-		-	-	-
sauvagi	X	-	X	-	-	-	-	-	-	-	-		X	-	X
Pseudis paradoxa bolbodactyla	-	-	X	-	-	-	-	-	-	X	-		-	X	X
Leptodactylus bufonius	-	-	X	X	-	-	-	X	-	X	-		X	-	-
mystaceus	X	-	X	-	-	-	-	X	-	-	-		-	-	-
mystacinus	-	X	-	-	-	-	-	-	-	-	-		-	-	-
ocellatus	X	X	X	-	X	-	X	X	X	X	-		X	-	X
pentadactylus labyrinthicus	-	-	-	X	-	-	X	-	-	X	-		-	X	-
p. podicipinus	X	X	X	-	-	X	X	X	-	-	-		-	X	X
podicipinus petersi	-	-	-	-	-	-	-	-	X	-	-		-	-	-
sibilatrix	X	-	-	-	-	-	-	X	-	-	-		X	-	X
Physalaemus cuvieri	X	X	-	X	X	-	X	-	-	X	-		-	X	X
fuscomaculatus	-	X	X	-	X	-	-	X	-	-	-		X	-	X
Eupemphix natteri	-	-	-	-	-	-	X	-	-	-	-		-	X	X
Elachistocleis ovalis	X	X	X	-	-	-	-	-	-	X	-		-	X	-
Hypopachus mulleri	-	-	-	-	-	X	-	-	-	X	-		X	-	X

LIST OF HERPETOLOGICAL LOCALITIES IN ORDER OF ITINERARY

CORUMBA, Mato Grosso, Brazil (19°S.-57°38′W., elev. 215 m., km. 0).*

We arrived during the night of February 20, and on the evening of February 21 collected frogs in the flooded fields near and beyond the C.M.F.B.B. station. On February 22, Dr. Francisco Gonçalves de Aguiar arranged for a trip to the vicinity of Mt. Urucum, type locality of many Peracca species. In the evening we continued the frog collecting both at the old localities south of the town and along the shore of the Río Paraguay below the bluff

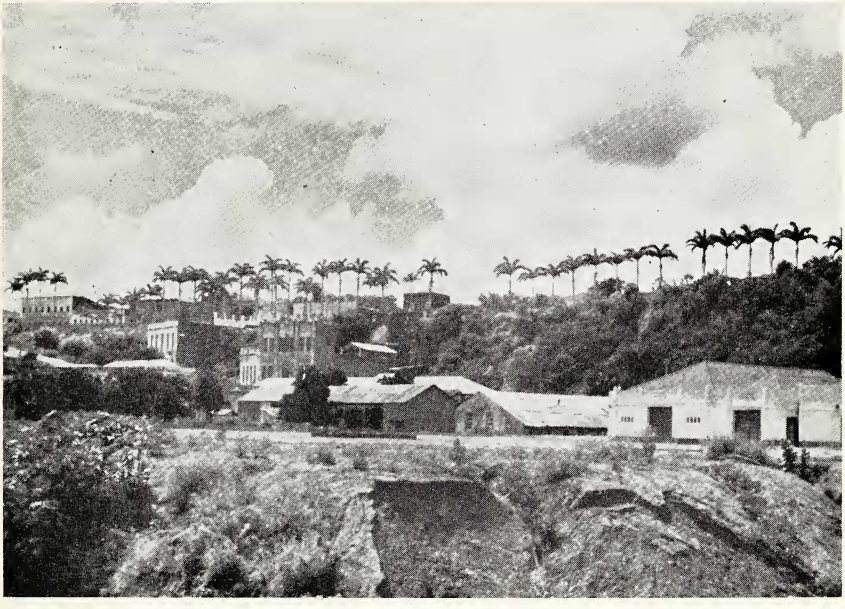

Fig. 4. View of the Corumbá bluff from the shore of the Río Paraguay. The material in the foreground is fill extending out into the fringing marshes that harbor large populations of *Leptodactylus ocellatus*. The city of Corumbá lies atop the bluff on the far side of the palm-flanked avenue

on which the town is situated (Fig. 4). Further frog collections were made on February 23 and 24, much of the last day being spent in obtaining a series of *Teius teyou* in scrub areas west of town.

EL CARMEN, Estación Rivero Torres, Santa Cruz de la Sierra, Bolivia (18°48′30″S.-58°33′50″W., elev. 212 m., km. 113).

The station lies slightly above the northern extensions of the flooded pantanals, often characterized by open stands of palms, which intervene between

* These co-ordinates are estimated from the map; all others are from Peña and Escobar (1947). The elevations are from a map kindly furnished by the C.M.F.B.B. and refer to those of the railway stations, while the last figures give the distance (in kilometers) west along the right of way from the Corumbá station.

Corumbá and Carmen, and approach to within one kilometer of its eastern side. For a view of the cut-over, flooded low country see Figure 2, plate 29 in Duellman (1958), which was taken near Palmito 25 km. east of El Carmen. We arrived by train on the evening of February 25 and enjoyed the memorable hospitality of Dr. C. Moreno T., who did everything possible to facilitate our work. The weather was clear and hot during our stay and the last rains were said to have fallen on February 23.

On the evening of February 25 we collected frogs and insects in a series of pools and cattle wallows along the right of way, one to three kilometers east of the station. During the day of February 26 we visited the station

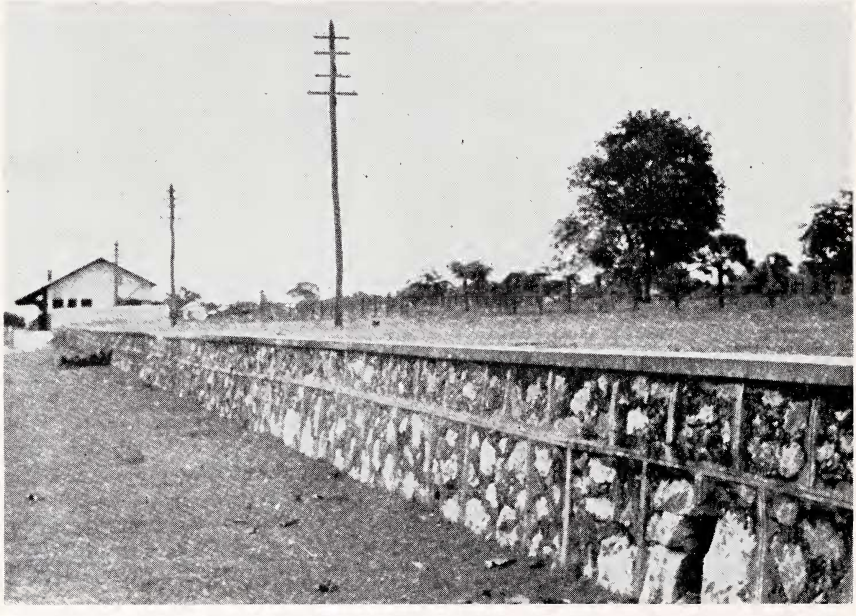

Fig. 5. View of retaining wall in Rivero Torres Station (El Carmen) showing two of the drainage holes in the foreground. All of the small frogs were taken in the short grass below the wall

reservoir and returned at night to the region east of the town. On the 27th we worked over several log piles in the railway yard and also collected through a farmed region to the south.

At the suggestion of Dr. Moreno T. we spent the early evening in an inspection of a low stone wall within the station (Fig. 5). This locality proved to be immensely fruitful. Large numbers of juvenile *Physalaemus cuvieri* and *fuscomaculatus*, a series of *Elachistocleis* and several species of *Leptodactylus* were taken in the short grass before the retaining wall or in its drainage holes. It was far from clear what attracted this unusual aggregation of small frogs to this relatively barren site. A series of *Phyllopezus* was later collected on walls of the station building.

We left on the morning of February 28, travelling by train to NARANJOS

Fig. 6. Cactus of undetermined species approximately seven meters tall at the edge of dense scrub forest near El Carmen

Fig. 7. Spiny bottle trunk tree, possibly *Chorisia* sp., family Bombacaceae in scrub near El Carmen. The picture had to be taken diagonally to avoid obstructions in the foreground

(elev. 260 m., km. 180), where we had time to shoot two of several specimens of *Tropidurus torquatus* sunning themselves on a pile of ties. From here we continued to Roboré by motorized hand-car.

ROBORE, Santa Cruz de la Sierra, Bolivia (18°20′12″S.-50°59′13″W., elev. 330 m., km. 251).

This town lies to the south and just below the first hills of the Serranía de Santiago, and a small creek from the mountains passes through the town. We stayed in the station guest house and spent the first evening collecting frogs which were calling from the many small pools and puddles left by the day's rain. The following day (March 1) we walked up the ravine shooting *Teius* and collecting insects. The forest of the hills seemed denser and higher than that of the lowlands through which we had passed from Naranjos. That evening we obtained a ride to a spot some four km. south of the station. Here we collected a number of species and observed a *Caiman* in a system of

Fig. 8. Carnival celebration at Limoncito, 33 km. east of El Portón. Compare with illustrations in Fonseca (1929)

interconnected sloughs and pools fringed by the open scrub forest on very sandy soil. We collected a number of other forms while walking back to the station and flushed many night-hawks resting on the road. We left by motorized hand-car after noon on March 2.

EL PORTON, Santa Cruz de la Sierra, Bolivia (18°10′S.-60°8′W., elev. 550 m. at highest point of track, km. 298).

This station (Fig. 10) is located on the southeastern end of the railroad cut which forms the highest point between Corumbá and Santa Cruz. The line

runs along the base of the escarpment (Fig. 9), passes through the cut and descends after passing across the divide into the Amazon drainage system.

We arrived at dusk on March 2 and during the night collected through the flat station area and the railroad cut. The temperature was noticeably lower than in the lowlands, and the last of the frogs had stopped calling by 0130 hours. Mr. Orivaldo O. Nogueira presented us with five preserved snakes collected in the vicinity.

Prior to our departure the next morning we walked again through the cut where we found large numbers of *Dendrobates flavopictus* and shot various lizards on the rock walls.

SAN JOSE DE CHIQUITOS, Santa Cruz de la Sierra, Bolivia (17°50′S.-60°45′ W., elev. 350 m., km. 385).

This very old settlement lies in a region of low scrub some kilometers north of the escarpment of the Serranía de San José which is visible from the out-

Fig. 9. View of the southern escarpment of the Serranía de Santiago from railway track 5 km. east of El Portón

skirts of town. We arrived in a drizzle on the afternoon of March 3, and after being established in a guest house spent most of the night collecting around the station. On the morning of March 4 we visited the church, which had been founded in the early eighteenth century and now housed a missionary group. They showed us about the compound and assisted us in collecting bats, lizards and frogs in and about the old buildings. Madre Esther Bottega and several of her pupils accompanied us on an insect collecting trip to the east of town during the afternoon.

We left by motorized hand-car on the morning of March 5 and were

dropped at TUNAS (elev. 335 m., km. 492) where we collected some frogs, while waiting for the rail-operated tank-truck that was to take us to the Río Grande.

EL PAILON, (5 km. from E. shore of the Río Grande), Santa Cruz de la Sierra, Bolivia (17°42′S.-63°44′W, elev. 350 m., km. 601).

After several hours of travel in the rain we arrived at this station at dusk on March 5, to find that it would be impossible to cross the river that night. The station was located in slightly higher forest close to the edge of the river zone which was characterized by small streams and pools. We slung our hammocks in a shack belonging to the railroad and immediately started to collect. Enormous and deafening choruses sounded from all directions and it was difficult to distinguish the voices of individual species in the general din. Far greater numbers of individuals could have been taken if the aim had not been directed toward obtaining series of a maximum number of species. Though most of the pools appeared to be identical to the observer it was repeatedly found that certain species had congregated in or around a single pool, with no specimens being taken anywhere else. Sixteen species were collected during the night and it appears certain that others were also present, particularly since congregations of two of the forms were not located until just before exhaustion forced me to retire.

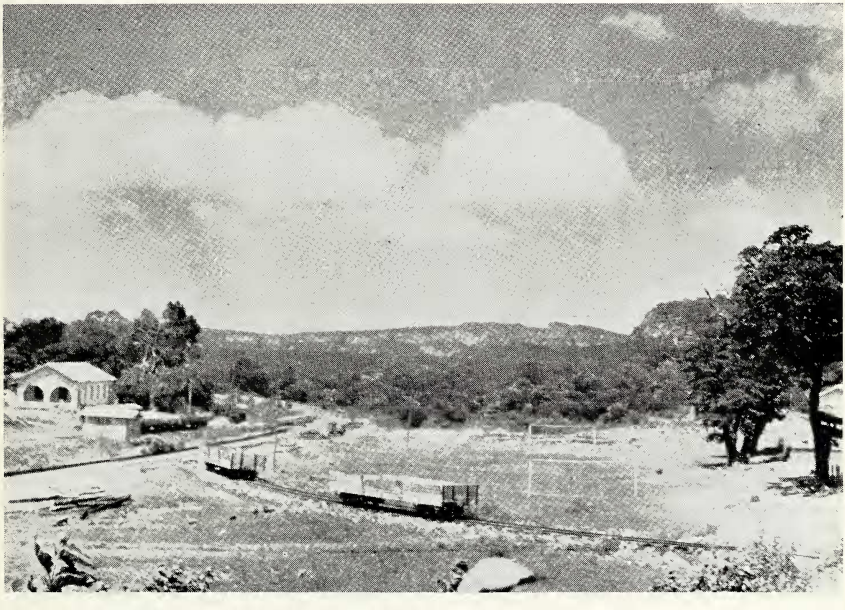

Fig. 10. View south across station at El Portón. The main line passes from the center toward the left, and only a spur passes toward the right. Hillside from which the picture was taken was locality where *Hyla senicula* was heard and collected. *Hyla megapodia, Eupemphix natteri, Physalaemus cuvieri, Leptodactylus ocellatus* and *L. p. podicipinus* were collected in the wet grassy region in the center of the picture

Since the track was in too poor condition to permit the use of powered vehicles we walked the five kilometers to the edge of the Río Grande, while our baggage followed on a hand-car pushed by two workers. The forest was much higher near the river, though the term gallery forest would still seem inappropriate. Small but swollen creeks meandered through it and had undercut the roadbed in a number of spots. The Río Grande was wide, shallow and interrupted by large sand-bars. We crossed it on a barge powered by paddles and tow ropes. The station at the west shore was PUNTO DE PAILAS (elev. 350 m., km. 608) where we collected only a single toad before the night train took us to SANTA CRUZ DE LA SIERRA (17°46′12S.-63°11′00″W., elev. 536 m., km. 651). The collections were packed here and returned to Brazil with Padre Pereira, while I continued by plane to LaPaz.

ACCOUNT OF SPECIES

SALIENTIA

(Below the name of the species, digits at the beginning of each item indicate the number of specimens)

Dendrobates flavopictus (A. Lutz), 1925.

32 El Portón, March 3. C.M. 36155 (15), M.C.Z. 29813-25 (+4).

These small brightly colored frogs were extremely common within the railroad cut through the mountain and around the reservoir drainage leading down from the ridge. Their call is a piping cry *hoowit-hoowit* and could be heard from ditches along the sides of the track.

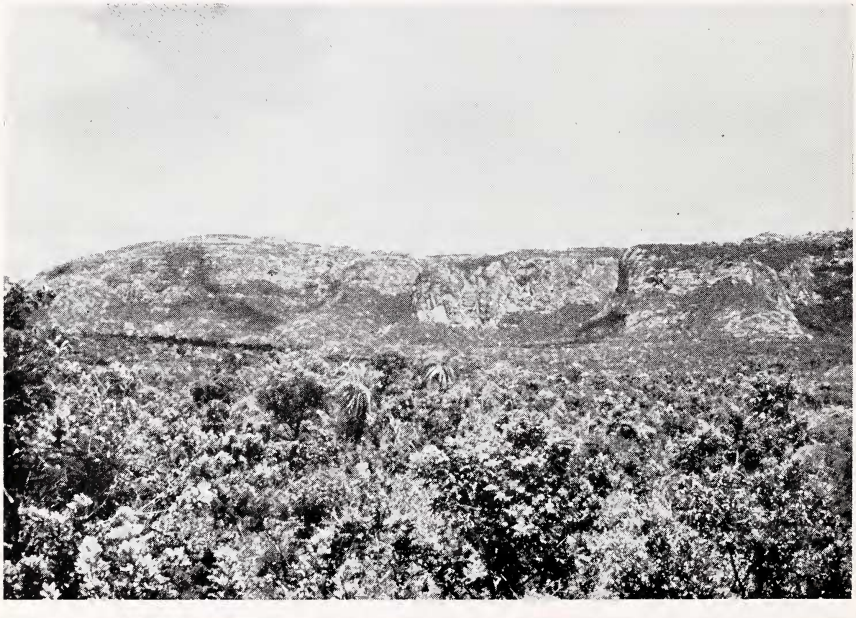

Fig. 11. Southeast view of the northern escarpment of the Serranía de Santiago, taken from the track some 3 km. west of El Portón. The forest appeared much less disturbed here than in the lower areas

The species appears to be definitely diurnal. A diligent search during the night disclosed no specimens, though they were found to be abundant in the early morning. In the cut they were restricted to the shady sections where the rock ballasted road-bed, flanked by shallow ditches, passed between two sheer rock walls. Here they would sit along the bottom of the rock face or on the crushed stone of the road-bed. When disturbed they would take a number of jumps *up* the very steep rock face and then enter cracks or crevices.

The black body bears markings of bright yellow and red. Cott (1940, p. 204) remarked on the effective warning coloration of this genus and his comments were brought home in force while watching these frogs frequenting exposed localities in broad daylight.

Numbers of the specimens were carrying 8-10 tadpoles on their backs The larvae had a body length of approximately 4 mm. and were arranged crossways in two rows with the tails toward the outside. When shaken or handled roughly the frogs would loose the tadpoles fairly readily. Several frogs were observed to drop off larvae while crossing the ditches flanking the track. The frogs were not discovered until we were almost ready to leave the locality, and in my haste I neglected to sex the carriers.

Bufo granulosus major Müller and Hellmich, 1936.

36 San José, March 3-4. C.M. 36217 (18), M.C.Z. 29826-43.

These small toads were extremely common in open areas throughout the town. They were found calling at the margins of small muddy puddles in the middle of the roads and in closely cropped fields. Several pairs were collected in amplexus. The call is a high nasal whine.

San José is the type locality of the race tentatively named *B. g. major* by Müller and Hellmich (1936). Gallardo (1957) who has revised the group considers this race valid.

Bufo paracnemis A. Lutz, 1925.

16 Corumbá, Feb. 21-22. C.M. 35908-16, M.C.Z. 29302-08.
7 Roboré, Feb. 28. C.M. 35892-6, M.C.Z. 29290-1.
3 El Portón, March 2. C.M. 35907, 36153, M.C.Z. 29301.
19 San José, March 3-4. C.M. 35897-906, M.C.Z. 29292-300.
2 El Pailon, March 5. C.M. 36168-9.
1 Pto. Pailas, March 6. C.M. 36152.

These large toads are apparently abundant throughout this area. Specimens were collected hopping about the roads after dark and males were observed calling in Corumbá, Roboré, San José, Pailon and Pto. Pailas, though none was found at El Carmen.

Ticks from Corumbá and Roboré toads were identified as *Amblyomma dissimile* Koch by Dr. Joseph Bequaert of the Museum of Comparative Zoology.

Bufo typhonius (Linnaeus), 1758.

1 El Portón, March 2. C.M. 36233.
10 El Pailon, March 5. C.M. 36244-8, M.C.Z. 29844-8.

The Portón specimen was found sitting on the floating leaf of a plant in the center of a small pool. The Pailon series was calling from a flooded ditch near the railroad embankment about two kilometers east of the station.

The call is a *clack-clack-clack* loudly and rapidly repeated several times. Two pairs were seen in amplexus.

Hyla geographica punctatissima (Reinhardt and Lütken), 1862.

6 Four km. S. of Roboré, March 1. C.M. 36108-10, M.C.Z. 29849-51.

The frogs were calling from a flooded thicket on the edge of a deep and exceedingly ill-smelling pool. They were calling while sitting on the horizontal branches of shrubs within 30-60 cm. of the water surface. Their call is a peculiar chuckling cry, *shreek-eck-eck-eck,* repeated irregularly.

When alive the specimens were a dirty yellow brown dorsally and had a whitish venter. The hands and feet were red. The belly was speckled and the sides of the legs and the body were barred.

Shreve advises that although these specimens would be included under *punctatissima* according to Parker's ideas, more recent studies indicate that the Bolivian population may be a distinct race.

Hyla leucophyllata (Beireis), 1783.

11 El Pailon, March 5. C.M. 36111-5, 36212, M.C.Z. 29852-6.

These small hylids always called from within 25 cm. of the water-level of the ditches, generally while sitting on reeds, stems of bushes, grass blades, etc. The call is a multisyllabic chuckle or chatter. One pair was collected in amplexus.

In life the markings of these small frogs are a bright saffron yellow.

Hyla megapodia Miranda-Ribeiro, 1937.

20 Corumbá, Feb. 21-23. C.M. 36141 (10), M.C.Z. 29857-66.

5 El Portón, March 2. C.M. 36147-9, M.C.Z. 29867-8.

24 El Pailon, March 5. C.M. 36151 (12), 36175, M.C.Z. 29869-79.

These frogs were extremely abundant at Corumbá and Pailon, at which latter site they were one of the chief contributors to the deafening choruses. A large chorus was also heard in Roboré though the site was unfortunately inaccessible.

In this species the restriction of calling site appears to be far less severe than in some of the smaller hylids. The Corumbá frogs were calling while clinging to the vertical stems of bushes and weeds growing in shallowly flooded fields at the edge of a pool. The Roboré site appeared to be similar to this. At Portón the frogs were congregated around a flooded depression in a meadow and were calling from the ground. In spite of the fact that there were no bushes around the pool this might still indicate a more advanced portion of the breeding cycle, were it not for the fact that several of the Corumbá pairs were in amplexus, while none of the Portón individuals were observed in mating position. In Pailon again they were by no means restricted to a single site, but specimens were observed and taken while calling along the entire length of the embankment. Some of these frogs were sitting on the sand around the tracks, on the grassy sides of the embankment and at various elevations in the bushes flanking both sides of the embankment.

The Corumbá chorus was composed of equal numbers of *Hyla megapodia* and *Hyla r. nasica.* The latter form called from the same plants and pairs of it were also found in amplexus. No mixed pairs were observed. The calls of the two species were rather easy to distinguish, differing in frequency and depth, and the average size difference of the two forms may also assist in species recognition.

Shreve informs me that he has seen the cotype of *H. megapodia* (M.C.Z. 15668) and does not believe it to be a synonym of *H. raniceps* (Cope), 1862 as stated by Cochran (1955, p. 96).

Hyla minuta Peters, 1872.

7 El Portón, March 2. C.M. 36134 (4), M.C.Z. 29880-2.

All of these specimens were calling from the aerial parts of plants rooted in the water in the center of a pool one meter deep on the northwestern side of the pass. Their call is more piercing than that of *Sphoenohyla nana* and is given singly instead of in repetitive series. The latter form was calling from various spots on the periphery of the same pool, generally from grasses or reeds.

The color pattern of the specimens appears to fall into pattern (a) of Cochran (1954, p. 122) though it differs in that the posteriormost marking is a fairly regular V.

Hyla rubra nasica Cope, 1862.

26 Corumbá, Feb. 22-23. C.M. 36161 (13), M.C.Z. 29883-95.
1 El Carmen, Feb. 25. M.C.Z. 29896.
2 1.5 km. east of El Carmen, Feb. 26. M.C.Z. 29898-9.
1 El Carmen, Feb. 27. M.C.Z. 29897.
1 San José, 1954, (M. Bottega). C.M. 34847.
3 El Pailon, March 5. C.M. 36100-1, M.C.Z. 29900.

All calling specimens and pairs of these frogs were collected in bushes at or near water. In Corumbá they were very common and were calling in a mixed chorus with *Hyla megapodia* (See notes on that form) clinging to the vertical stems of bushes and weeds rooted in the shallowly flooded fields at the edge of a pool. The specimens from 1.5 km. east of Carmen were calling from bushes 1-2 m. above and 3 m. from the edge of a pond. The Pailon specimens were in bushes next to a flooded ditch. Both specimens collected in Carmen were on building walls, one within the veranda of the residence and the other on the inside wall of the railroad shed.

A number of the Corumbá specimens were in amplexus as was the single pair from Pailon. My notes mention that the calls of the two Pailon males were more irregular than those of the Corumbá specimens.

Shreve advises me that if this name has been correctly applied in this case, the form seems to be but slightly distinct from northern *H. rubra*. What is called *H. megapodia* in this report has in the past been referred to as *H. nasica*.

Hyla raniceps (Cope), 1862.

1 San José, 1954. (M. Bottega). C.M. 34848. (See note under *H. megapodia*.)

Hyla senicula Cope, 1868.

1 Corumbá, Feb. 21. C.M. 36121.
3 El Portón, March 2. M.C.Z. 30137-9.
21 El Pailon, March 5. C.M. 36207, 36150 (10), M.C.Z. 29901-10.

The Corumbá specimen was calling from the same bush at the edge of a small pool from which the individual specimens of *Phyllomedusa sauvagi* and *Sphoenohyla nana* were collected. A number of specimens were calling in the bushes of the bluff overlooking the station at Portón, during the early part of the evening when we were collecting other species in the flooded

station meadows. It started to cool off as the evening progressed and the specimen collected was the only one still calling at 2200 hours. It called approximately 10-15 meters away from and above the water. All of the Pailon specimens were calling from bushes 1 to 1.5 meters above the ground. No females were noted or collected. The call is an extended wailing snore, repeated several times.

Shreve advises that *senicula* and *melanargyrea* both seem to occur in Bolivia. It is therefore doubtful whether they are both subspecies of *marmorata* (See also Cochran, 1955, p. 174).

Phrynohyas zonata (Spix), 1824.

2 juv. 1 km. east of El Carmen, Feb. 25. C.M. 26213, M.C.Z. 29911.

15 (7 ♂♂, 1 ♀, 7 juv.) El Pailon, March 5. C.M. 36087-90, 36143-6, M.C.Z. 29912-8.

These large hylids were calling from a floating position in the center of various small pools. They were very shy, sinking when disturbed and reappearing at the edge of the pool amid the partially submerged grass. When they rise, they hold the body almost vertically, and only the nostrils and eyes break the surface. The single female was collected in a bush approximately one meter above and in the center of the pool from which a number of males were calling. The characteristic call is similar to the roar of a bull.

The Carmen juveniles were collected at night when they were sitting on the sandy railroad embankment, some 300 meters from the nearest pool. The Pailon juveniles came from similar localities.

The juveniles have the same whitish secretion as the adults. This is a heavy slime of the consistency of well masticated bubblegum. It soon hardens to a brownish solid that is extremely hard to remove from the hands. There also appeared to be some toxic effect connected with it as my hands burned and were slightly inflamed on March 6. It is possible, however, that part of this was due to the continued exposure to formalin.

Sphoenohyla nana (Boulenger), 1889.

1 Corumbá, Feb. 21. M.C.Z. 29919.

37 1.5 km. east of El Carmen, Feb. 25-26. C.M. 36171-3, 36183-5, 36201 (10), 26202 (10), M.C.Z. 29920-30.

16 Roboré, Feb. 28. C.M. 36203 (8), M.C.Z. 29931-8.

4 Three km. south of Roboré, March 1. C.M. 36271-4.

7 El Portón, March 2. M.C.Z. 29939-45.

5 San José, March 3-4. C.M. 36174, 36178-9, M.C.Z. 29946-7.

4 El Pailon, March 5. C.M. 36180-1, M.C.Z. 29948-9.

All but one specimen of this abundant frog were taken or observed while sitting on low bushes, reeds or other plants rooted in pools or growing in temporarily flooded areas. The single exception was a specimen from Corumbá (M.C.Z. 29919) calling from a bush near a pool in an open field. This observation is in agreement with Goin's remarks on habits (1957, p. 29) in his discussion of this genus.

All of the series included calling males, and many more individuals were heard than taken in every instance. The second Corumbá specimen was collected from reeds along the marshy shore of the Río Paraguay, the Carmen specimens from water plants in a pond, the Roboré series from dead brush

in a flooded slough at the edge of a lake. The Portón specimens were found on reeds in the shallower portions of a stream and the San José and Pailon series were also calling from water plants.

This small frog has a sibilant repeated call somewhat like the chirp of a cricket.

Phyllomedusa hypochondrialis (Daudin), 1803.

11 1.5 km. east of El Carmen, Feb. 25-27. C.M. 36102-6, 36176, M.C.Z. 29950-4.

Males and females were sitting or walking on the aerial stems and leaves of various plants growing in the shallow end of a pool. Most of the specimens were within 10 cm. of the surface. These frogs moved very slowly when disturbed and the males were often found calling with the legs extended asymmetrically and hands and feet grasping stems and small branches. The call was an irregular chatter that is difficult to describe.

In life these medium-sized frogs had a bright green dorsum. Their venter was white and the sides of the legs were orange barred with black.

Shreve advises that these frogs may belong to the race *azurea* Cope, 1862, which was not recognized by A. Funkhouser (1957).

Phyllomedusa sauvagi Boulenger, 1882.

1 Corumbá, Feb. 21. C.M. 36092.

7 1.5 km. east of El Carmen, Feb. 26. C.M. 36137-40, M.C.Z. 29955-7.

All of the specimens were collected in the immediate vicinity of ponds or pools, with the males calling. The Corumbá specimen was two meters high in the single bush of an open grassy area next to a small pool. The El Carmen specimens were in trees around two small ponds, most of the specimens being two to three meters up in the tree, with the sole exception of a male calling from the top of a bush, 50 cm. high, in the center of one of the ponds. Most of these frogs could be obtained by climbing for them, but one had to be shot out of the top of a tall but slender bush.

The frogs moved very slowly with alternate movements of the limbs. They were rarely seen to jump. When picked up they produced a white, slimy secretion. The call is an irregular chuckling *Corr-rr-rr-ack,* and when several specimens were calling at a single site they seemed to alternate.

These relatively large frogs are a bright metallic green in life, set off sharply with white lateral lines and some isolated white spots.

Phyllomedusa pailona Shreve, 1959.

6 El Pailon, March 5. C.M. 36278-80, M.C.Z. 29677-9.

1 juv. El Pailon, March 5. M.C.Z. 29680.

The frogs of the first series were calling from points more than a meter above the ground in trees and bushes along the flooded ditches. The single partly digested juvenile was taken from the stomach of the hatchling *Chironius pyrrhopogon.* The call of this frog is an irregular chuckle.

In life these specimens were green dorsally with yellow markings on the sides of the body and along the legs.

This is the type series of the only new frog described from this collection.

Pseudis paradoxa bolbodactyla A. Lutz, 1925.

3 1.5 km. east of El Carmen, Feb. 26. C.M. 36222-3, M.C.Z. 29958.

7 El Pailon, March 5. C.M. 26218-21, M.C.Z. 29959-61.

The Carmen specimens were heard to call and were found floating amid

the grass fringing the shore of a small pond. The Pailon specimens may have been calling, but the din produced by the many other species was sufficient to mask the call of all but the most vociferous forms. When disturbed the specimens seem to submerge backwards and disappear without a ripple showing on the surface (See Gans, 1956, for a popular discussion of habits. Gallardo has suggested in conversation that the egg-mass illustrated in the 1956 note probably belongs to a species of *Leptodactylus* rather than to *Pseudis.)* The streamlining of the muscular body and a very slippery mucus made them extremely difficult to grasp. One of the Pailon males was in amplexus when caught. The female escaped.

Leptodactylus bufonius Boulenger, 1894.

5 One km. east of El Carmen, Feb. 25-26. C.M. 36187, M.C.Z. 29962-5.
7 El Carmen, Feb. 27. C.M. 36156-60, 36187, M.C.Z. 29966.
14 San José, March 3-4. C.M. 36229 (7), M.C.Z. 29967-73.
22 El Pailon, March 5. C.M. 36091 (10), 36107, M.C.Z. 29974-84.

The San José and Pailon specimens were calling from open places near grassy spots close to pools and puddles. They have a whistling call.

Others were collected on the road-bed at night, and the six Carmen specimens occupied the openings of as many drainage holes in the retaining wall of Carmen station (See Fig. 5). Every hole contained a specimen of this species, a tarantula, or both. These frogs are very wary and excellent jumpers. If surprised in the open they will move off with a series of three to six meter-long jumps. The third of these jumps is always at an angle of 60 to 90 degrees to the preceding one.

Besides the more usual secondary sex characters this species exhibits striking differences in the shape of the rostrum. The males show a sharp spatulate edge extended forward to present a profile view of a straight line from eye to rostral tip. The rostral edge shows strong projection beyond the tip of the nose. The females have the top of the head descending sharply and the rostrum bluntly rounded. The occurrence of various secondary sex characters in this and related genera might prove to be a profitable subject for investigation.

Leptodactylus mystaceus (Spix), 1824.

1 Corumbá, Feb. 23. C.M. 36162.
2 1.5 km. east of El Carmen, Feb. 25-26. C.M. 36097, M.C.Z. 29985.
4 San José, March 4. C.M. 36117-8, M.C.Z. 29987-8.

The Corumbá specimen was under a log, the east of Carmen specimens at the edge of a pond, while the San José specimens came from buildings of a church compound into which they had strayed.

Leptodactylus mystacinus Burmeister, 1861.

2 El Carmen, Feb. 27. C.M. 36247, M.C.Z. 29986.

The specimens were found sitting in the short grass before the retaining wall at the station.

Leptodactylus ocellatus (Linnaeus), 1758.

3 Corumbá, Feb. 22-23. C.M. 36154, 36182, M.C.Z. 29989.
24 1.5 km. east of El Carmen, Feb. 25-26. C.M. 36215 (11), M.C.Z. 29990-30002.
2 El Carmen, Feb. 27. C.M. 36214, 36275.

5 Roboré, March 1. C.M. 36134-6, M.C.Z. 30003-4.
1 El Portón, March 2. C.M. 36099.
51 San José, March 3-4. C.M. 36204-6, 36242-4, 36251-70, M.C.Z. 30005-13 (+16).
1 Tunás, March 5. M.C.Z. 30013.
13 El Pailon, March 5. C.M. 36167 (7), M.C.Z. 30014-9.

None of these frogs was observed while it was calling nor were pairs found in amplexus, which seems curious in view of the fact that many specimens were observed and that most other species in the same region appeared to be breeding. The specimens were collected in a variety of habitats, in roads, at the margin of the Paraguay River, along the margins of ponds and pools, etc.

Leptodactylus pentadactylus labyrinthicus (Spix), 1824.

1 Reservoir, 1 km. north of El Carmen, Feb. 26. C.M. 36166.
1 El Portón, March 2. M.C.Z. 30135.
1 juv. ? El Portón, March 2. C.M. 36188.
1 El Pailon, March 5. C.M. 36170.

Two adult specimens were seen at El Portón, both in well protected situations. The first one was noted close to the entrance of a deep crevice in the rock wall out of which water was running. It escaped back into the wall before it could be caught or shot. The second one was sitting in the entrance of a drain-pipe, which discharged into a concrete drainage canal. The frog was caught after the pipe behind it had been blocked. The Pailon specimen was floating at the edge of a deep pool. Several other specimens were also seen here, but these always dived before I could get within several meters. These large frogs appear to have good eyesight. They are very wary and select well protected calling sites.

This species is supposed to have a toxic secretion. One of the persons with whom I collected in Brazil would start to sneeze as soon as he handled a specimen. The active substance must have different effects on different persons as I neither suffered from dermatitis nor had any other symptoms at any time.

Leptodactylus p. podicipinus (Cope), 1862.

1 Corumbá, Feb. 22. C.M. 36165.
5 1.5 km. east of El Carmen, Feb. 26. C.M. 36234-5, M.C.Z. 30020-2.
2 El Carmen, Feb. 27. C.M. 36236-7.
8 Three km. south of Roboré, March 1. C.M. 36238-41, M.C.Z. 30023-6.
2 El Portón, March 2. C.M. 36248, M.C.Z. 30027.
5 San José, March 3. C.M. 36119-20, 36164, M.C.Z. 30028-9.
1 Tunás, March 5. M.C.Z. 30136.

All but the specimens from Carmen and vicinity were collected near water. The Corumbá specimen was sitting in the open at the edge of a roadside pool, while the Roboré specimens were partially sheltered by small logs and the Portón specimens were found under rocks. These specimens from east of Carmen were collected in a drying cattle wallow, those from Carmen proper in the grass before the station wall. The San José specimens were found on the floor of buildings of the church compound into which they seemed to have strayed inadvertently. Many desiccated corpses in building corners indicated that the few steps to the outside must form a formidable obstacle to their

escape. The Roboré and Portón specimens seemed to be calling from hiding.

The single poorly preserved juvenile (M.C.Z. 30136) from Tunás was tentatively assigned to *L. podicipinus petersi* (Steindachner) by Shreve.

Müller and Hellmich (1936) refer to this form as *L. caliginosus* Girard.

Leptodactylus sibilatrix (Wied), 1824.

4 Corumbá, Feb. 22-23. C.M. 36231-2, M.C.Z. 30030-1.
15 San José, March 3-4. C.M. 36230 (8), M.C.Z. 30032-8.

The Corumbá specimens were sitting near roadside puddles at the edge of the Río Paraguay. Others were found in open grassy spots. The San José specimens also called from grassy areas, but the specimens would always be partly hidden under tufts of grass so that they were difficult to see even where the grass was cropped short. The species gave its whistling call from both wet and dry places.

Physalaemus cuvieri Fitzinger, 1826.

9 Corumbá, Feb. 21-23. C.M. 36124-31, 36163.
2 Reservoir, 1 km. north of El Carmen, Feb. 26. C.M. 36116, M.C.Z. 30039.
70 El Carmen, Feb. 27. C.M. 36142 (35), M.C.Z. 30040-74.
2 Roboré, Feb. 28. C.M. 32122, M.C.Z. 30075.
2 El Portón, March 2. C.M. 36208, M.C.Z. 30076.
3 El Pailon, March 5. C.M. 36249-50, M.C.Z. 30077.

These frogs were abundant and could be heard calling every night, and in certain regions during the day as well. (The Carmen specimens were collected while they were calling during the afternoon.) In spite of this it was difficult to obtain adequate series because of their calling habits.

The males call from shallow water (1-3 cm. deep) at or near the edge of larger bodies of water. They sit almost always in small open spots, but slightly larger than their inflated body, and shaded by tufts of grass. When calling the skin is stretched to translucence so that it becomes difficult to recognize them even with direct vertical illumination. Their call is a whine resembling the protracted meow of a cat.

A large series of juveniles was found sitting in the short grass below the stone wall at El Carmen station. Others were noted at the entrances to the drainage holes which they shared with specimens of a large tarantula spider and adult *Leptodactylus bufonius*.

Physalaemus fuscomaculatus (Steindachner), 1863.

6 1.5 km. east of El Carmen, Feb. 25-26. C.M. 36209-11, M.C.Z. 30078-80.
56 El Carmen, Feb. 27. C.M. 36133 (28), M.C.Z. 30081-108.
8 Roboré, Feb. 28. C.M. 36093-6. M.C.Z. 30109-12.
1 San José, March 4. C.M. 36123.

The form was found calling at Roboré. The males were calling from the floating position in the center of a small stream pool. They were very strongly inflated, puffed into a ball with the major portion of the body riding above the water.

The call is a loud *whaam-ump* with the accent on the second note.

Some of the specimens from east of Carmen were collected while they were sitting on the road-bed at night, others in a drying cattle wallow. The juveniles of this species and of *P. cuvieri* formed the greatest part of the large number of small frogs collected in the grass before the station wall at El Carmen.

Eupemphix natteri Steindachner, 1863.

2 El Portón, March 2. C.M. 36098, M.C.Z. 30113.

These specimens were collected while calling from under logs lying on moist ground in the station clearing at the southern end of the pass. Their call is a booming sound repeated several times.

Elachistocleis ovalis (Schneider), 1799.

1 Corumbá, Feb. 22. C.M. 36177.
3 One km. east of El Carmen, Feb. 25. C.M. 36198-200.
19 El Carmen, Feb. 27. C.M. 36190-7, M.C.Z. 30114-24.
4 El Pailon, March 5. C.M. 36245-6, M.C.Z. 30125-6.

Only a single specimen was calling and only a single pair was noted in amplexus. Both were found at Pailon. The frog that appeared to be calling was positioned at the base of a dense reed thicket at the edge of a pool. It had almost completely left the water, only the toes of the hind feet touching the surface. The hind legs and body were extended vertically upward into a straight line and the fore limbs touched the reed stem. The call was a very high thin piping whistle, almost completely masked by the clamour of the dozen other species calling within 10 meters.

The pair in amplexus was resting on the floating leaf of a water plant in the center of the same pool.

All other specimens were collected at night in a number of semi-covered sites. The Corumbá specimen was crouching under a piece of rock in the center of an open road, while the east of Carmen specimens were crouching near lumps of rock or pieces of manure on the track, possibly waiting for passing insects.

The largest series was taken at the base of the rock wall at Carmen station. They were sitting between the tufts of closely cropped grass, and when disturbed would flee not by hopping off but rather by burrowing, winding their way between the interlaced network of stems and exposed roots as if lubricated. Certain specimens appeared to protrude from tunnels leading to the grass roots.

The color in life is greyish, with prominent but irregularly shaped bright red spots on the sides of the body and legs. Only a single specimen (M.C.Z. 30124) lacked these red spots and demonstrated instead a light gray middorsal line that continued onto the back of each hind-limb.

Hypopachus mülleri (Boettger), 1885.

2 Three km. south of Roboré, March 1. C.M. 36189, M.C.Z. 30127.
15 El Pailon, March 5. C.M. 36216 (8), M.C.Z. 30128-34.

The Pailon males were calling from the floating position in track-side pools. Their bodies were enormously inflated, giving them a circular outline in plan view, broken only by the head which retains its original form. When disturbed they would deflate and sink below the surface of the muddy pool. They were very easy to collect as they did not change their position when diving, but just sunk vertically to the muddy bottom of the pool. Three pairs were collected in amplexus.

The call is a loud protracted snore reminiscent of a foghorn.

The two juvenile Roboré specimens were collected at night under the bark of fallen logs. They inflated themselves when picked up.

CROCODILIA

?Caiman sp.

Two small (0.75-1.00 m.) specimens were seen from the train, one near Naranjos and the second before San José. Another slightly larger specimen was seen at night, while I was wading in the slough three km. south of Roboré. Though apparently stunned after being shot, it escaped into deep water before it could be reached.

TESTUDINATA

Testudo sp.

Fragments of a burned shell were found at the Tunás siding.

LACERTILIA

Phyllopezus pollicaris przewalski Koslowsky, 1895.

(Lagarto domestico, Escorpión)

5 El Carmen, Feb. 27. C.M. 35856-7, D.Z. (3).
1 juv. 3 km. south of Roboré, Feb. 28. D.Z. (1).
2 El Portón, March 2. C.M. 35858-9.
4 San José, March 3. C.M. 35860-1, D.Z. (2)
3 San José, 1954, (M. Bottega). A.M.N.H. 74730, C.M. 34839-40.

These harmless lizards are held in considerable awe by some of the local people who believe that their bite is highly venomous. With the exception of the juvenile Roboré specimen picked up at night under the bark of a stump and of the two Portón adults collected from under the bark of a fallen trunk during the day, all specimens were collected in or near buildings. They were fairly numerous on the walls of the railroad shed in Carmen and many more were seen than collected on the walls of the old church in San José. The lizards seem to be strictly nocturnal.

Since the racial characters differentiating the two subspecies (Vanzolini, 1953) are those of mature specimens, the juvenile can not be definitely assigned. A check of other specimens of this species in U. S. museums disclosed a record for *P. p. przewalski* from Villa Montes, Bolivia, (M.C.Z. 28632) and one for the nominate race from Río Reto, Brazil (M.C.Z. 3132). Both of these records also agree with the scheme proposed by Vanzolini.

Teius teyou (Daudin), 1802.

16 Corumbá, Feb. 24. C.M. 35879-86, D.Z. (8).
3 El Carmen, Feb. 26-27. C.M. 35887-8, D.Z. (1).
2 Roboré, March 1. C.M. 35889, D.Z. (1).

These lizards were fairly common in many open bushy areas. The fact that none was collected on the western leg of the trip possibly reflects the rainy weather rather than absence of the species.

Tropidurus spinulosus (Cope), 1862.

2 Reservoir, 1 km. north of El Carmen, Feb. 26. C.M. 35874, D.Z. (1).
1 El Carmen, Feb. 27. C.M. 35878.
5 San José, March 4. C.M. 35875-7, D.Z. (2).
3 San José, 1954, (M. Bottega). C.M. 34836-8.

The Carmen reservoir specimens were shot during the day while they were sitting approximately six meters above the ground on the trunks of trees; the Carmen juvenile was taken under the bark of a log in the station at night.

The form was abundant on the buildings of the church compound in San José and was observed while it was hunting on the roof during the day.

Tropidurus torquatus (Wied), 1820.
9 El Carmen, Feb. 27. C.M. 35863-8, D.Z. (3).
2 Naranjos, Feb. 28. C.M. 35869, D.Z. (1).
7 El Portón, Feb. 3. C.M. 35870-3, D.Z. (3).

Part of the Portón series was collected on rock walls during the day; all others were on piles of lumber and railroad ties. The lizards were always found close to the ground and were strictly diurnal.

Mabuya frenata frenata (Cope), 1862.
1 El Carmen, Feb. 27. C.M. 35862.

Shot on woodpile in Carmen station. A second specimen was seen in a similar location, 0.5 km. north of the village, but escaped.

OPHIDIA

Boa enydris (Linnaeus), 1754.
1 ♂ El Portón, 1953, (O. O. Nogueira). C.M. 34845.

Snout-vent plus tail length of the specimen is 615+175 mm.

Chironius pyrrhopogon (Wied), 1825.
2 El Pailon, March 5. C.M. 34823-4.

These hatchling specimens were coiled at the ends of small branches in a bush overlooking a track-side pool at night. One disgorged a juvenile *Phyllomedusa* (M.C.Z. 29680).

They were identified by Dr. J. R. Bailey who states that "they are very close to *pyrrhopogon* of my latest paper (1955). They differ essentially only in having 29 and 30 maxillary teeth, which is high but not unexpected as can be seen from the truncated frequency distribution. I have not worked over Bolivian material which perhaps averages higher."

Dryophylax pallidus (Linnaeus), 1758.
1 ♂ San José, 1954, (M. Bottega), C.M. 34820.

This specimen has 148 ventrals, 56/56 caudals, 19 dorsals, 7 upper labials and a divided anal. The scales are faintly keeled. Snout-vent plus tail length is approximately 420+105 mm.

Elapomorphus tricolor Duméril and Bibron, 1854.
2 (1 juv., 1 ♀) San José, 1954, (M. Bottega). C.M. 34846-7.

The two specimens have 208 and 199 ventrals respectively; both have divided anals and 15 dorsals at midbody and their tails are incomplete. Snout-vent lengths are 198 and 545 mm.

Erythrolamprus venustissimus (Wied), 1821.
1 ♀ El Portón, March 3. C.M. 34835.

The snake was picked up by a track walker while it was crossing the roadbed in the early morning. The specimen has 198 ventrals, 33/33 caudals, a divided anal and 15 midbody dorsals. Snout-vent plus tail length is 628+65 mm.

The head is black. A white band crosses behind the eye, and produces a mottling of the parietals. The body is red with black bands, each divided into two by a central white band. All dorsal scales show a tendency toward black pigmentation of their tips and posterior edges. The nuchal collar is single and black. It extends over the first six vertebrals.

Imantodes cenchoa (Linnaeus), 1758.

1 ♀ El Portón, 1953, (O. O. Nogueira). C.M. 34819.

The specimen has 243 ventrals, 141/141 caudals, a divided anal and 17 midbody dorsals. Snout-vent plus tail length is 280+110 mm.

Leimadophis typhlus (Linnaeus), 1758.

1 ♀ D.O.R., road Corumbá to Mt. Urucum, Feb. 23. C.M. 34841.

3 (1 ♀, 2 juv.) San José, 1954, (M. Bottega). C.M. 34842, 34821-2.

The juveniles have a clear upper lip, while there is some invasion of the dorsal color in adults. The smallest specimen still has the black nuchal collar. This is followed posteriorly by a lighter band, and some black speckling on the back. The other juvenile has the dorsal dark bordered. The D.O.R. adult was a striking blue-green dorsally before preservation. The venter is clear in all specimens. The adult coloration is very similar to that of a male specimen from "Santa Cruz de la Sierra" (M.C.Z. 11860, J. Steinbach coll.) identified as *L. t. brachyura* (Cope) by Shreve.

Scale counts and measurements are:

	Sex	Ventrals plus caudals	Dorsals	Anal	Snout-vent plus tail length
C.M. 34841	♀	167+53/53	19	D	544+125
C.M. 34842	♀	169+x	19	D	580+x
C.M. 34821	juv	149+48/48	19	D	240+47
C.M. 34822	juv	x+x	19	D	125+22
M.C.Z. 11860	♂	165+54/54	19	D	412+91

Leptodeira annulata pulchriceps Duellman, 1958.

2 San José, 1954, (M. Bottega). C.M. 34103-4.

These two specimens were sent to Dr. W. Duellman who was revising the genus at the time. They form part of the series upon which this new race was established (1958).

Lystrophis semicinctus (Duméril and Bibron), 1854.

1 juv. El Carmen, Feb. 27. C.M. 34829.

2 juv. El Portón, 1953, (O. O. Nogueira). C.M. 34830-1.

1 juv. San José, 1954, (M. Bottega). C.M. 34832.

The Carmen specimen was collected under a rock near the village.

These four juveniles show a coloration similar to that of several adults (M.C.Z. 11856, 29038, 29255-8) collected by the elder Steinbach in Santa Cruz and Buena Vista respectively. The entire series shows decided individual variation in the degree of ventral melanism. There also seems to be an increasing north-south cline in ventral counts through this region. The specimens furthermore appear to show sexual dimorphism in tail length and caudal counts. The extent of this may be estimated from the table.

	Sex	Ventrals plus caudals	Dorsals	Anal	Snout-vent plus tail length
C.M. 34829	♂	151+38/38	21	D	182+28
C.M. 34830	♀	143+30/30	21	D	163+23
C.M. 34831	♀	151+30/30	21	D	172+22
C.M. 34832	♂	154+40/40	21	D	177+28
M.C.Z. 11856	♂	151+37/37	21	D	412+28
M.C.Z. 29038	♀	154+26/26	21-19	D	370+45

Upper labials always 8.

Oxyrhopus rhombifer Duméril and Bibron, 1854.

1 El Carmen, Feb. 26. C.M. 34826.

1 El Portón, March 3. C.M. 34827.

1 San José, 1954, (M. Bottega). C.M. 34825.

The Carmen and Portón specimens were found under logs near the track. The Carmen specimen contained remnants of two lizards, apparently *Tropidurus*.

The identification is that of Dr. J. R. Bailey, who states *(in litt.)* that the specimens appear to be intermediate between *O. r. inequifasciatus* Werner and *O. r. septentrionalis* Vellard.

? Philodryas psammophideus Günther, 1872.

1 ♀ San José, 1954, (M. Bottega). C.M. 34851.

This small and very poorly preserved specimen agrees fairly well (except as noted) with Boulenger's description (1896, p. 132) of this rare species, previously recorded from Uruguay and northern Argentina only. The vertebral stripe is indistinct on the body and is not edged with black, and the lateral stripe is not apparent though traces may be seen on the cheek. There is a considerable amount of black speckling under the chin and in the gular region.

The specimen has 198 (± 4) ventrals, 90/90 caudals, a divided anal, 19 scale rows at midbody and 8 (45)/9 (56) upper labials. Snout-vent plus tail length is 305+90 mm.

Pseudoboa guerini Duméril and Bibron, 1854.

1 juv. San José, 1954, (M. Bottega). C.M. 34844.

This (alcoholic) specimen still has the juvenile color pattern. The snout is dark brown to a point just posterior to the eyes. A whitish-yellow band crosses the nuchal region, including the parietals and the first six to seven vertebrals. Beyond these the dorsum is dark brown, starting to lighten caudad of the first quarter of the body. The sides of the neck are dark, but the brown color begins to break up with the third, fourth, fifth and sixth rows of dorsals being irregularly invaded by lighter color. The chin and venter are a dirty yellow-white.

The specimen has 200 ventrals, 94 caudals, 19 dorsals, a single anal and 8 upper labials. Snout-vent plus tail length is 256+77 mm.

Rhadinea genimaculata (Boettger), 1885.

2 San José, 1954, (M. Bottega). C.M. 43852-3.

These two specimens proved most difficult to identify because of the presence of an incomplete light band across the nuchal region. Such a band was not present on the nape of the only other specimen (M.C.Z. 3000, "Brazil" Thayer Expedition) initially available for comparison, nor was it mentioned in descriptions of this species.

Examination of five additional specimens in the Museum of Zoology of the University of Michigan, indicated what appears to be a geographical gradient in this character. The band was absent in U.M.M.Z. 108766 from Barreiras, Bahia and U.M.M.Z. 108765 from Pirapora, Minas Gerais, both in Brazil. A light spot was present on each side of the nuchal region between the vertebral and lateral bands of U.M.M.Z. 108764 from Porto Esperança, Mato Grosso, Brazil, while two further Steinbach specimens (U.M.M.Z. 64549)

from Santa Cruz, Bolivia, agreed with the San José specimens in showing the incomplete nuchal bands.

The San José specimens, a male and a female respectively, have 196 and 194 ventrals, 45/45 and 58/58 caudals, divided anals, 17 dorsal scale rows, and 8 (45) upper labials. Snout-vent plus tail length are 341+69 and 328+83 mm.

The tails of both specimens appear superficially blunted in that they are fairly stout and then suffer a sharp reduction near their ends. This is also the case in the M.C.Z. and U.M.M.Z. specimens and appears to be a characteristic of this (and possibly several other related) species.

Sibynomorphus turgidus (Cope), 1868.

1 ♂ 3 km. south of Roboré, March 1. C.M. 34833.

1 ♀ San José, 1954. (M. Bottega). C.M. 34834.

The Roboré specimen was caught at night while it was crossing a sandy road in low scrub forest near a flooded slough.

The specimens were identified by Dr. James A. Peters.

The male specimen has 160 ventrals, 54/54 caudals, a single anal, and 15 dorsals. Snout-vent plus tail length is 269+65 mm. The ventral count of the female can not be determined. The specimen has 45/45 caudals, a single anal, 15 dorsals and snout-vent plus tail length of 341+69 mm.

Xenodon merremi (Wagler), 1824.

2 ♀ San José, 1954, (M. Bottega). C.M. 34817-8.

Counts of these two specimens are ventrals 148, 147, anals divided, caudals 37/37 both, and dorsals 19-19-17 and 19-19-15. Snout-vent and tail lengths are 778+116 and 705+114 mm.

Xenodon severus (Linnaeus), 1754.

1 juv. El Portón, 1953, (O. O. Nogueira). C.M. 34843.

This juvenile specimen shows the typical coloration described by Boulenger (1894, p. 149). There are nine light dorsal bands from nape to anus. The scutellation is: ventrals 136, divided anal, 36/36 caudals, 21 dorsals, and 8 upper labials. Snout-vent plus tail length is 208+29 mm.

Bothrops neuwiedi Wagler, 1824.

1 ♂ San José, 1954, (M. Bottega). C.M. 34828.

The anterior portion of this snake is severely damaged.

REFERENCES

Ahlfeld, Federico

1946. Geologia de Bolivia. Revista del Museo de La Plata (Nueva Serie), Sección Geologiá, v. 3, p. 5-370.

Anonymous

1941. Normais climatologicas. Serviço de Meterología, Serviço de Informação Agrícola, Ministério da Agricultura, Rio de Janeiro, 176 p.

Bailey, Joseph R.

1955. The snakes of the genus *Chironius* in southeastern South America. Occasional Papers of the Museum of Zoology, University of Michigan, no. 571, 21 p.

Bechyné, Jan

1956. Reise des Herrn G. Frey in Südamerika: Galerucidae (Col. Phytophaga). Entomologische Arbeiten des Museums G. Frey, v. 7, no. 1, p. 241-358.

1958. Notizen zu den neotropischen Chrysomeloidea (Col. Phytophaga). Entomologische Arbeiten des Museums G. Frey, v. 9, no. 2, p. 478-706.

Boulenger, George Albert

1894. Catalogue of the snakes in the British Museum (Natural History). London, v. 2, 382 p.

1896. Catalogue of the snakes in the British Museum (Natural History). London, v. 3, 727 p.

Cochran, Doris Mable

1954. Frogs of southeastern Brazil. Bulletin of the United States National Museum, no. 206, 423 p.

Cott, Hugh

1940. Adaptive coloration in animals. London, 508 p. (1957 reissue).

Duellman, William E.

1958. A monographic study of the colubrid snake genus *Leptodeira*. Bulletin of the American Museum of Natural History, v. 114, art. 1, p. 1-152.

Duguid, Julian

1931. Green hell, adventures in the mysterious jungles of eastern Bolivia. Century Company, New York, 339 p.

Fonseca, Olympio Oliveira Ribeiro da

1929. Diario de uma viagem ão oriente da Bolivia, de Porto Esperança a San José de Chiquitos. Memórias do Instituto Oswaldo Cruz, Rio de Janeiro, v. 22, p. 175-222.

Funkhauser, Anne

1957. A review of the neotropical tree-frogs of the genus *Phyllomedusa*. Occasional Papers of the Natural History Museum of Stanford University, no. 5, p. 1-90.

Gallardo, José

1957. Las subspecies Argentinas de *Bufo granulosus* Spix. Anales del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", v. 3, no. 6, p. 337-74.

Gans, Carl

1956. Frogs and paradoxes. In Animaland, Staten Island Zoological Society, New York, 4 p.

Goin, Coleman Jett

1957. Status of the frog genus *Sphoenohyla* with a synopsis of the species. Caldasia, v. 8, no. 36, p. 11-31.

Haseman, John D.

1912. Some factors of geographical distribution in South America. Annals of the New York Academy of Science, v. 22, p. 9-112.

Herzog, Th.
1913. Die von Dr. Th. Herzog auf seiner Reise durch Bolivien in den Jahren 1910 und 1911 gesammelten Pflanzen. Teil 1. Mededeelingen van 's Rijks Herbarium Leiden, no. 19, p. 1-84.

Lane, Federico
1956. Cerambycoidea Neotropica nova IV (Coleoptera). Dusenia, v. 7, no. 1, p. 1-32.

Lizer, Carlos A.
1919. Informe sobre la expedition al Chaco boliviano. Boletín del Ministerio de Agricultura de la Nación, Buenos Aires, v. 24, no. 1, p. 1-47.

Magarinos Torres, Francisco Eugenio and Armando Mortera
1948. Atlas pluviometrico do Brasil (1914-38). Seccião de Hidrologia, Divisão de Aguas, Ministério da Agricultura, Rio de Janeiro, bull. 5.

Mann F., Guillermo
1951. Esquema ecologico de selva, sabana y cordillera en Bolivia. Instituto de Geografía, Universidad de Chile, pub. no. 3, 236 p.

Müller, Lorenz and Walter Hellmich
1936. Wissenschaftliche Ergebnisse der Deutschen Gran Chaco-Expedition. Amphibien und Reptilien. Teil 1. Amphibia, Chelonia, Loricata. Stuttgart, 120 p.

Osborne, Harold
1954. Bolivia, a land divided. Royal Institute of International Affairs, London, 144 p.

Parodiz, Juan
1958. A new Bolivian land snail of the genus *Drymaeus*. Breviora no. 95, p. 1-3.

Peña, Abel and Lillo Escobar
1947. Sintesis geografica de Bolivia. La Paz, 416 p.

Shreve, Benjamin
1959. A new *Phyllomedusa* from Bolivia. Breviora no. 113, p. 1-6.

Travassos, Lauro, *and others*
1957. Excursão cientifica realizada nas zonas das Estradas de Ferro Noroeste do Brasil e Brasil-Bolivia em janeiro e fevereiro de 1955. Publicações avulsas do Museu Nacional, Rio de Janeiro, no. 20, 44 p.

Vanzolini, Paulo Emilio
1953. Sobre o gênero *Phyllopezus* Peters (Sauria, Gekkonidae). Papéis Avulsos do Departamento de Zoologia de Secretaria da Agricultura, São Paulo, v. 11, no. 22, p. 353-69.